Distributed Interactive Fire Mission

Fire Control for Force XXI and the Army After Next
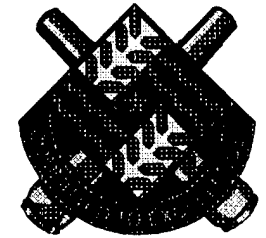
Armament Research Development and Engineering Center
Fire Support Armaments Center
Fire Control and Life Cycle Software Engineering Division
Picatinny Arsenal, New Jersey

195
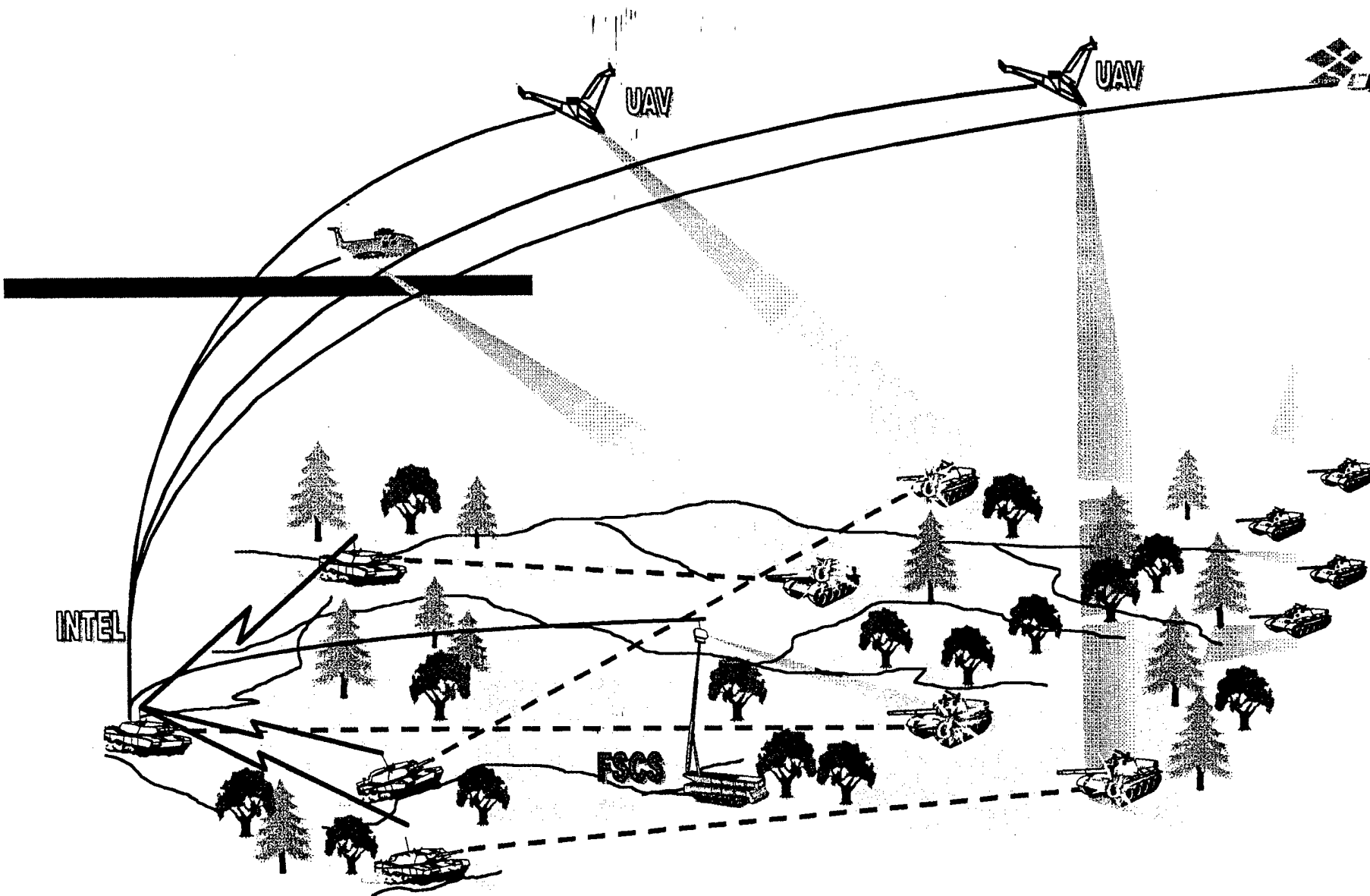
Distributed Interactive Fire Mission

Description/Definition

MULTI-AGENT FIRE CONTROL SYSTEM

A linked fire control system framework consisting of distributed battlefield platforms that act in concert with one another to provide enhanced firing solution computation and efficient application of firepower assets to engagement of individual and multiple targets. Linking may be considered through a collective or master-slave configuration.

196

**DISTRIBUTED INTERACTIVE FIRE MISSION
(DIFM)**

197

Distributed Interactive Fire Mission

Description/Definition

**Software Based / Software Development and Implementation**

■ **Maximum use of existing system hardware / C4 JTA & HTI compatible**

  - **FBCB2 as crew interface / Appliqué for future use**
  - **Uses existing computer/ADP hardware/NAV package/Long haul commo**
  - **Applies Multi-Agent Fire Control algorithms**

■ **Purpose**

  - **Rapid Point Fire Maximum Ph Engagement and Mass Fires**
  - **TERM/ERM/BLOS**
  - **Fire control baseline for AAN**

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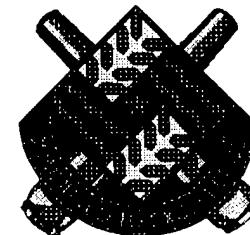
Description/Definition

Software Modules and Functions

Target Position Measurement	Target Dynamics Measurement
Data Filtering	Data Processing:
Target Position Conversion	Ph Calculation
Mass Fires/Point Fires Selection	Target Prioritization
TERM/ERM BLOS Selection	Target-Shooter Assignment
Terrain Profile Intervention	Crew Override
Weapon/Sight Pointing Control	System Control/Run Time
Meteorological Compensation	Own Vehicle Position Measurement
Own Vehicle Dynamics Measurement	Display Drivers

199

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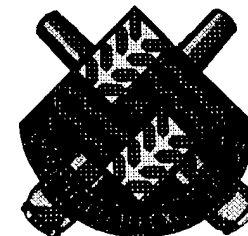
Description/Definition

Crew Tactile Interfaces

FBCB2 - Touch Screen / Icons

Commander's Control Handle Switches

Gunner's Yoke Switches / Palm Switch

Dead Man Switch (Crew Override)

Communications Interfaces

Improved Data Modem

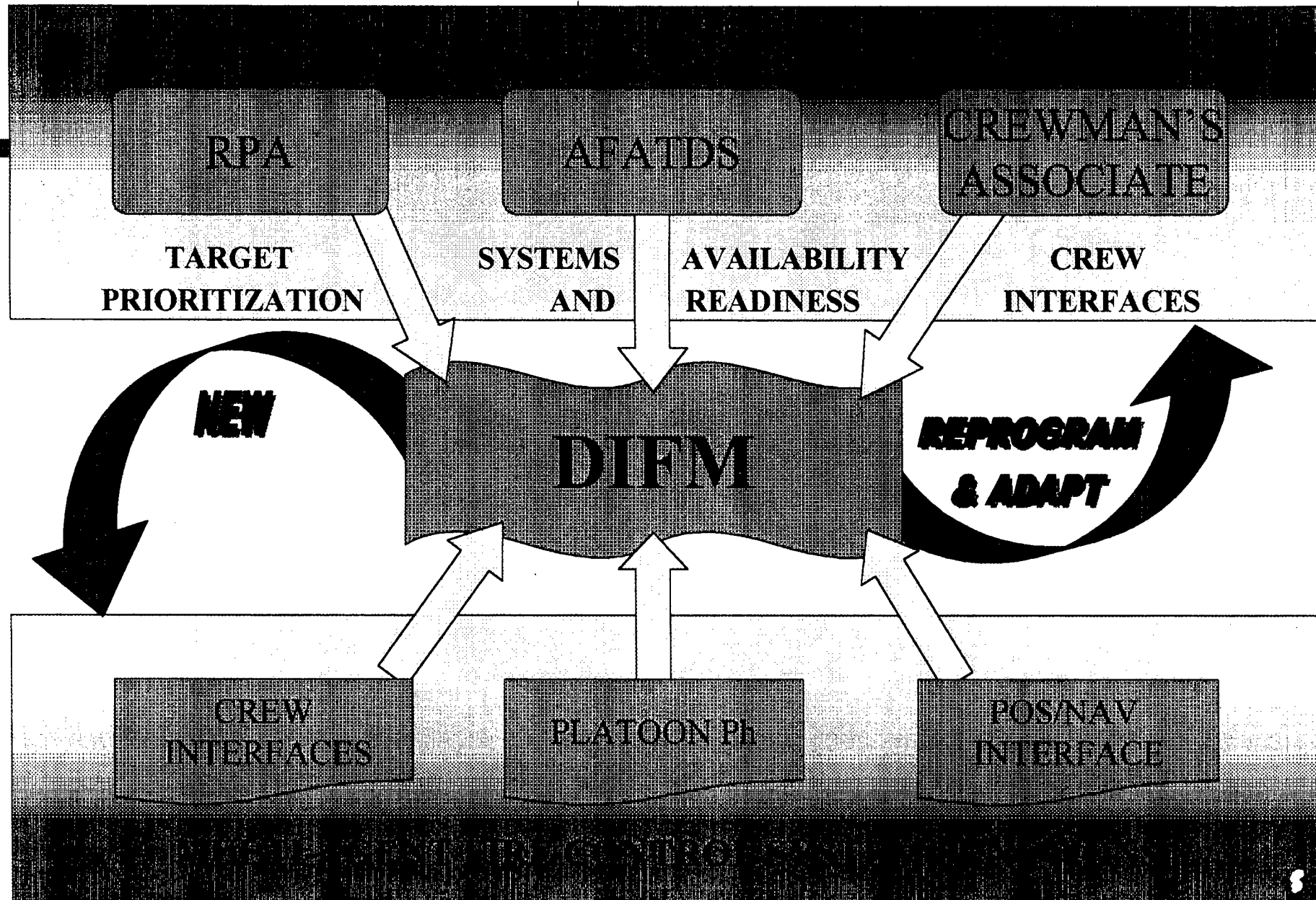SINCGARS (Incoming Assignments)

Low Power Wireless LAN (CO/PLT/Team)

Protocols

Position/Location Interfaces

GPS/PLGR

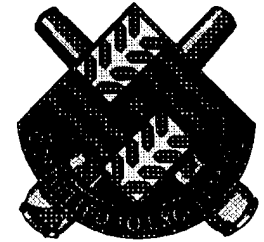VNAS

200

SOFTWARE ACQUISITION

RPA

AFATDS

CREWMAN'S ASSOCIATE

TARGET PRIORITIZATION

SYSTEMS AND

AVAILABILITY READINESS

CREW INTERFACES

NEW

DIFM

REPROGRAM & ADAPT

CREW INTERFACES

PLATOON Ph

POS/NAV INTERFACE

201

Distributed Interactive Fire Mission

Concept Features/Characteristics

- Provides REAL-TIME tactical fire assignments and adjustments throughout the battle

- Dynamic operation running continuously in background (transparent to user)

- Uses calculated Ph values for target assignments to each firing platform

- Filters available data to extract needed information

- Compares real-time instantaneous status of each firing platform (positions, rates, ammo, ready rounds, stabilization status, etc.)

- Uses a collective or master-slave approach to laying of individual firing platform guns

- Checks validity of available data acquired from each system and utilizes most valid available information

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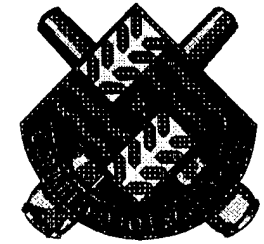
Sample Data Elements

- Target position (UTM or other)
- Target velocity, acceleration and direction
- Target state prediction
- Target threat prioritization
- Non-standard conditions:
    - Crosswind/rangewind velocity
    - Propellant grain temp
    - Muzzle position distortion
- Terrain data
    - Elevation/contour
    - Line of sight intersection

- Firing platform state
    - Cant
    - Roll/pitch position and rate
    - Multi-axis acceleration values
    - Ready round type
    - Target plane angle to line of sight
    - Range to targets
- Firing platform target data quality
    - Tracking data noise
    - Image quality
    - Data consistency
    - Range false returns

203

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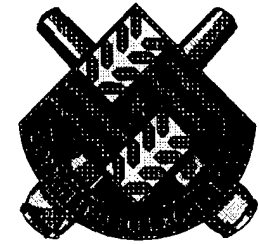
Is Not:

- **A command and control system**
- **A communications system**
- **B2C2 / CVCC / IVIS / FBCB2 / Appliqué**
- **Intended to be a planning or logistics status assessment tool**
- **A graphical display terminal or other crew interactive device**

But:

- **Must interface with all of these items, as appropriate, in order to function**

204

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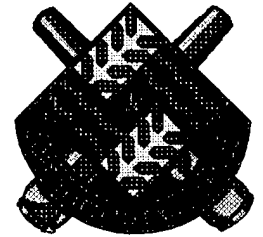
Payoff

- Uses best platform and target position measurement data to compute pointing solutions and hit probabilities for all unit elements (Improved small unit engagement accuracy)

- Mitigates the potential of overkill or underkill problems during multiple target engagements (No overlap and improved engagement efficiency)

- Reinforces ammunition conservation; mitigates "overkill"

- Enhances the effectiveness of TERM and other advanced ammunition concepts

- Reduces the possibility of friendly fire/fratricide using multiple vantage target data and passive visual interrogation before fire

- Takes maximum advantage of available multiple platform sensors to improve target state estimation and battlefield awareness

- Makes excellent use of an extensive and flexible C2 system

- Prioritizes data handling through mission parameters (Improved target servicing rates/rapid reaction)

205

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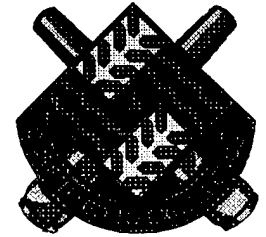
Status

- **DFD USAARMC directs TRADOC CEP using Battle Lab to evaluate merit in terms of user needs that are satisfied, and to identify what features are of highest value**
- **LTG Abrams (DCG, TRADOC) redirects CEP SOW to result in effective implementation of DIFM for M1A2 SEP system**
- **CEP plan and model acquisition being finalized**
- **Tech Base $ committed to TERM STO for DIFM/TERM fire control task**
- **PM-TMAS, ARDEC (FSAC/CCAC) seeking additional funding sources and support**
- **Additional unfunded STO requirement exists**
- **CRADA with industrial partner(s) welcome**
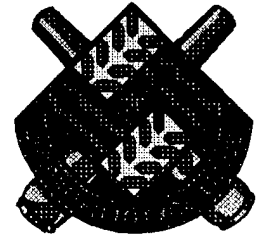
206

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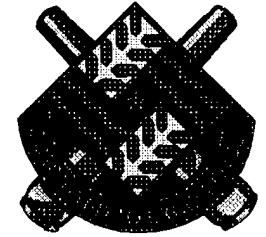
Approach/Plans

- **MAFCS CEP Kick-off meeting - July 1998**
- **Complete TRADOC CEP - November 1998**
- **Initiate DIFM/TERM STO Fire Control Task - October 1998**
- **Initiate DIFM STO Program - October 2000**
- **Complete TERM STO Fire Control Task - September 2002**
- **Complete DIFM STO Program - September 2003**

207

Distributed Interactive Fire Mission

Point of Contact

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208